

DR. RAINER DZIEWAS (Orcid ID : 0000-0003-1592-8461)

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Dysphagia in COVID-19 –multilevel damage to the swallowing network?

Rainer Dziewas¹, Tobias Warnecke¹, Patrick Zürcher², Joerg C. Schefold²

1: Department of Neurology, University, Hospital Münster, Münster, Germany

2: Department of Intensive Care Medicine, Inselspital, Bern University Hospital, University of Bern, 3010 Bern, Switzerland

Corresponding author:

Rainer Dziewas, MD

Department of Neurology

University Hospital Münster

48149 Münster

Germany

dziewas@uni-muenster.de

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We read with great interest the article “COVID-19: what if the brain had a role in causing the deaths?” by Tassorelli and co-workers, in which the authors generate and summarize hypotheses how SARS-CoV-2 may enter the peripheral and central nervous system and cause life-threatening complications [1]. With this letter we would like to contribute to this discussion by highlighting how different complications of COVID-19 may result in damage to central and peripheral parts of the swallowing network leading to dysphagia in critically ill COVID-survivors.

As demonstrated by a recent survey, dysphagia is a key concern on intensive care units [2]. According to the DYNAMICS trial dysphagia affects more than 10% of patients after extubation, about half of which remain dysphagic at hospital discharge [3]. Importantly, in this study, the incidence of dysphagia was even higher in specific subgroups, in particular in emergency admissions (18.3%) and in patients with acute neurological conditions and was independently associated linked to overall disease severity and with increased length of mechanical ventilation (MV). Dysphagia in the critically ill has been identified as key predictor of pneumonia, extubation failure, need for tracheostomy and prolonged MV, increased length of stay and overall adverse outcome and mortality [4].

The coronavirus disease 2019 (COVID-19) pandemic spreads worldwide with more than 3 million cases to date and growing numbers of ICU admissions. According to recent publications, around 5% of patients require ICU-treatment with a high proportion in need of prolonged MV due to acute respiratory distress syndrome and vasopressor treatment for septic shock [5]. In addition to these conditions, which were identified key risk factors for the development of critical illness polyneuropathy and myopathy (CIP/CIM), other neurological complications such as stroke, encephalitis, skeletal muscle injury and Guillain-Barré syndrome have also been reported in COVID-19 [6].

The act of swallowing is coordinated and executed by a widely distributed network that incorporates cortical, subcortical and brainstem structures as well as downstream peripheral nerves and muscles. As summarized in figure 1, all mentioned complications of COVID-19 target this network at different levels and critically ill patients are therefore prone to dysphagia. While this goes unnoticed and is of less relevance during the period of mechanical ventilation, dysphagia and related complications enter the scene when patients have been extubated, or, in

case of previous tracheostomy, the question of possible decannulation arises after successful weaning from MV. At this critical juncture, careful assessment of safety and efficacy of swallowing including management of pharyngeal secretions seems of utmost importance in COVID-19 survivors, since these patients are, due to the severity of lung disease, particularly prone to suffer from respiratory complications subsequent to tracheal aspiration.

The diagnostic workup in this context usually comprises of an aspiration screening (e.g. water swallow test as implemented in the Bernese ICU Dysphagia Algorithm [4]) and, in case of screening abnormalities, a full dysphagia assessment, including, where appropriate, instrumental testing with fiberoptic endoscopic evaluation of swallowing (FEES) [4]. Importantly, respective diagnostics steps are likely aerosol generating procedures, since patients, in particular those with severe dysphagia and aspiration, regularly cough during these tests. Because of the involved risks of virus transmission through aerosol emissions, dysphagia experts should wear appropriate personal protective equipment when approaching COVID-19 patients. Subsequent to the initial dysphagia assessment and implementation of first therapeutic interventions like dietary modifications and simple compensatory maneuvers, more refined treatments should be decided on a case-by-case basis with the option to postpone these until the patient was tested negative.

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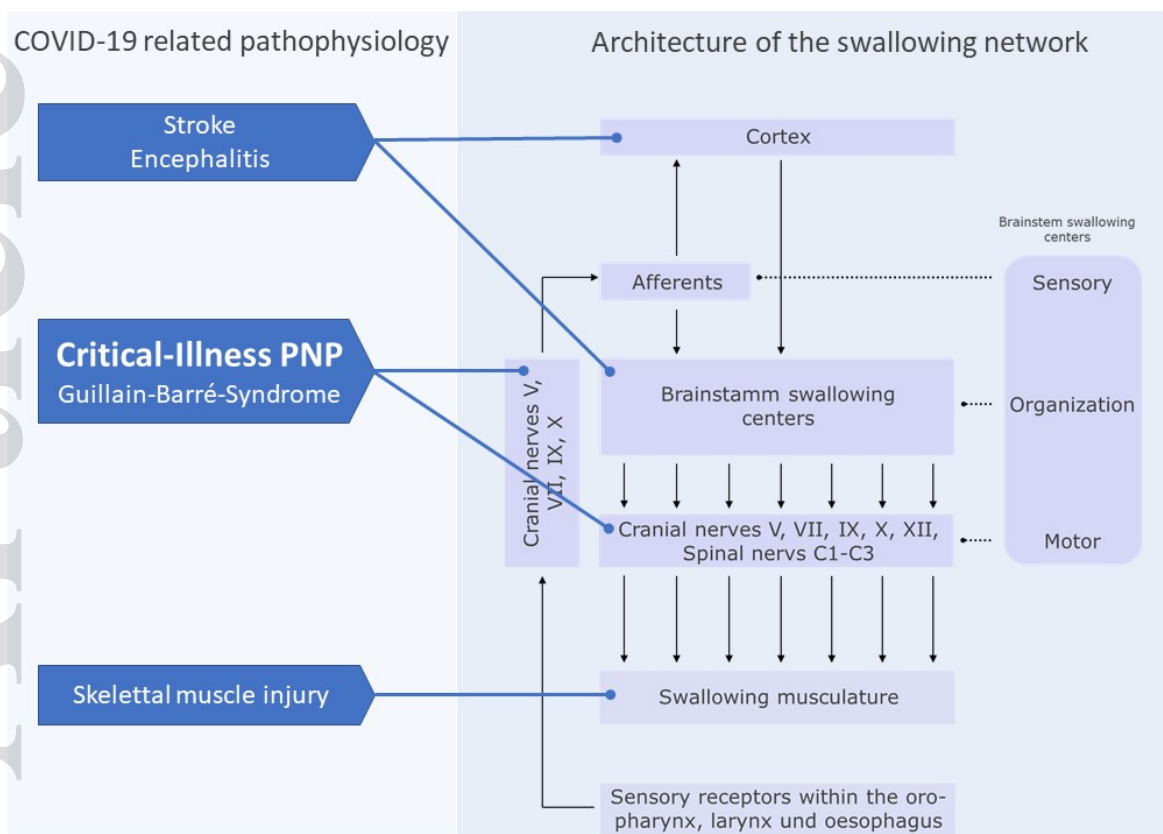


Figure 1. Dysphagia due to COVID-19 related pathophysiology.

The swallowing network has a multilevel architecture comprising of cortical, subcortical and brainstem structures as well as peripheral nerves and muscles. Clinical sequelae and complications of COVID-19 target different parts of this swallowing network.